C-AD
Radiation
Safety
Committee

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Minutes of Radiation Safety Committee of March 27, 2003

e-cooler Tests in Building 939

Present: J. Scaduto, A. Etkin, T. Srinivasan-Rao, I. Ben-Zvi, I.-H. Chiang, J. Zhao, N. Williams, J. Young, D. Beavis, L. Ahrens, and C. Schaefer

A series of tests are planned with electron beams in building 939. The tests are for development of electron beams, which will be used for "cooling" the RHIC ion beams and electron beams for e-RHIC.

The e-cooler tests will be conducted in stages. Each successive stage introduces new radiation considerations. Radiation hazards for the tests have been discussed by A. Stevens (see attachment 1 and 2).

The scope of this review is for the first phase with lower beam hazards than discussed in the report of A.J. Stevens. For the next several years the maximum beam energy will be 1.5 MeV and the maximum current will be 10 micro-amps. The review was conducted assuming that these represented the maximum operating parameters.

Two simple reports were used to examine the potential radiation levels. NCRP Report 51 Appendix E provides x-ray estimates for electrons striking a target (see attachment 3 also attachment 4). The dose rate for 1.5 MeV electrons on a high z target is roughly 100 rads-m^2 per mA-min. The 10 micro-amp beam will strike a copper target and therefore the expected radiation level due to x-rays is approximately 600 rads/hr at a foot. Without local shielding to reduce levels, the surrounding area is a class I area. Since the project expects to expand in the future (future phases), the entire room is planned to be a Class I area.

A laser beam excites electrons from a photocathode. These electrons are then accelerated by a superconducting RF cavity. The RF cavity may produce x-rays without the laser. An upper limit for the dose rate of the cavity was not known. It was therefore decide that the dual mechanisms to stop the radiation would both be attached to the power supply for the RF cavity. The CEE will need to review and approve the two shut-off mechanisms for the RF power supply **(Ck-fy2003-ecooler-322)**. The laser was another option to reduce the radiation source. The laser will have a shutter, which has interlocks for laser safety. This shutter will be used as a reachback in the event an RF interlock failure is detected **(Ck-fy2003-ecooler-323)**.

Measurements of the dose rate from the RF should be measured for future reference and possible interlock changes.

There may be large radiation levels at the entrance gate to the area. It was decide to use the plug door as part of the interlocks **(Ck-fy2003-ecooler-324**). This decision can be re-examined after dose rates are measured in the experimental area. The roof has a large port for installing/removing equipment with a crane. The shielding will be placed in the port. **(Ck-fy2003-ecooler-325)**
N. Williams presented an overview of the interlock logic. (See attachment 5) The final logic will be reviewed and approved by a sub-committee. **(Ck-fy2003-ecooler-326)**
The NBTF relays interlocks will be used as appropriate. The two tunnels have crash cords but not the experimental area. A crash cord/button will be added to the experimental area. **(Ck-fy2003-ecooler-327)** All doors have dual micro-switches. The NBTF used the lights out as a warning indicator that radiation was imminent. The committee recommends that this be changed to the new style of flashing lights and audible alert systems now in use. **(Ck-fy2003-ecooler-328)**

The experimenters have requested the ability to sweep and reset the area. Operators and CAS watch should be trained to sweep the area. The Accelerator Division Head, T. Rosner, can approve a limited list of experimenters to act as the lead on a sweep team. Two people are required for the sweep of the experimental area. They must have the same training, which of required for CA-D personnel for sweeping this area.

A layout of the experiment was presented (see attachment 6).

The experimental area will be most likely be posted as a controlled area. FS Rep. will determine the appropriate radiological posting for the experimental area. The committee recommends that the laser area, which has penetrations to the experimental area be posted as a Controlled Area till measurements are made of the penetrations.
Postings will be verified before operations. **(CK-fy2003-ecooler-329)**

The penetrations and the potential dose through them during operations will be reviewed by a sub-committee **(CK-fy2003-ecooler-330**).

There are plans to "tune" the cavity with a temporary small power supply, approximately 1000 times lower in power then the final supply. For this testing, it is necessary to be in the room with the RF cavity. For this special test the following items are required **(Ck-fy2003-ecooler-331):**

1) The room posted as a radiation area.
2) A chipmunk placed near the cavity to monitor radiation.
3) RCT measure that the levels are sufficiently low.

These conditions should be reviewed after the initial conditions are determined.

Attachments: (File copy and electronic file)

1. "Preliminary Analysis of Radiological Hazards Associated with an Electron Beam Test Facility for RHIC", A.J. Stevens, March 27, 2002
2. "Estimate of Photon Dose Through Laser Penetration at @ MeV, A.J. Stevens memorandum to D. Beavis, May 21,2002.
3. NCRP Report No. 51, Appendix E.
4. "A guide to Radiation and Radioactivity Levels Near High Energy Particle Accelerators", A.H. Sullivan, Pages 83-84.
5. ACS preliminary logic diagram.
6. Area Layout

CC:

RSC
Present
e-cooler file